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Attitudes of Vegetable Farmers towards Risk In Al-Mafraq Governorate – Jordan

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ABSTRACT

The main objective of this study is to examine vegetable farmers' attitudes towards risk in Al-Mafraq Governorate. A random sample of 68 vegetable farmers in Al-Mafraq Governorate was selected. In order to measure risk attitudes, utility functions for vegetable farmers in Al-Mafraq Governorate were estimated. For this purpose, Von Neumann– Morgenstern model was used. Based on the estimated utility functions, risk attitudes coefficient for each farmer was measured. Studying farmer's attitudes towards risk is very important in the decision-making process. These attitudes are considered to be the main constraints to the adoption rates of vegetable technology by farmers. Consequently, vegetable production is affected by these attitudes. Of the total random sample of 68 farmers in Al-Mafraq Governorate, a purpose sample of 30 vegetable farmers was selected, i.e. 12 farmers (40%), 14 farmers (47%), and 4 farmers (13%) were falling into three categories: risk avert, risk neutral and risk taker, respectively. They gave answers, which can be used for the purpose of utility function estimation. It is believed that those farmers took the subject seriously so that their decisions are good indications of their preferred choices. To analyze the relationship between farmers' personal characteristics such as age, education, farm size, family size, and experience in agriculture and their risk attitudes, a multiple linear regression model was used, The risk – coefficient is taken as the dependent variable, while the farmers' characteristics are taken as independent variables. The regression results of the study indicated that the coefficient of the intercept, the coefficient of age (X1), the coefficient of educational level (X2), were statistically significant at 5% of the significance level. The coefficient of family size (X5), the coefficient of farm size (X3), were statistically significant at 10% of the significance level. The coefficient of agricultural experience (X4) was not statistically significant.

Keywords: Timeliness, Reporting Lag, Annual Financial Reports.

1. INTRODUCTION

The agricultural sector is considered to be one of the most important economic sectors in Jordan; however, it has a fair contribution to the total domestic product where the contribution was 3 % of the value of total domestic product and with fixed basic prices (Central Bank, 2015). Moreover, the sector is closely related to local economic activities which contributed with about 27% of GDP, (Ministry of Agriculture, 2009).The total agricultural production of vegetables in Jordan for the year 2014 was approximately 2163 thousand tones of which 330 thousand tones were produced by Al-Mafraq Governorate, which makes 19 of the total production (Ministry of Agriculture, 2014). Vegetable farmers, like other businessmen, hope for satisfactory returns to their Labor, management and owned capital if they stay in business over a period of years. Risk and uncertainty contribute to discrepancies in the rates of adoption by vegetable farmers. The study of risk and uncertainty is very important to farmers in the decision -making process. The farmer's attitudes towards risk are considered to be the main constraints to the adoption rates of vegetable technology by farmers and to rural development programmes. Because of the high risk associated with wide fluctuations in returns and high input prices, the vegetable farmers in Jordan Valley are forced to minimize their risk action by only limiting themselves to the most important inputs of production. To adopt technology and development programmes to the very best, special attention should be paid to the attitudes of various groups of farmers towards risk. Therefore, it is important to research farmers; constraining attitudes and factors towards risk; and to point out their impact on the decision – making process.

2. LITERATURE REVIEW

Over the past years, a number of empirical studies have made explicit the importance of risk in farmers' managerial decisions. (Officer and Halter, 1968) derived utility functions for wool producers in northern New South Wales, Australia. They used three models of utility estimation, namely Von Neumann – Morgenstern, modified Von Neumann – Morgenstern, and Ramsey. The study tested the hypothesis that maximizing expected utility, as a criterion for decision, is superior to maximizing expected monetary values. The results indicated that the Ramsey model was superior to the von Neumann – Morgenstern models.

(Lin, Dean, and Moor, 1974) provided an empirical test for utility vs. Profit maximization in agricultural production in California. Utility and profit maximization crops and plans were determined for six large California farms. The results

of the study supported the hypothesis that Bernoullian utility is a more accurate predictor of farmer behavior than profit maximization.

(Moscardi and Janvry, 1977) examined attitudes towards risk among peasants in Puebla, Mexico. An econometric approach was used in the analysis. Results of the study indicated that estimation of risk aversion, following the indirect method outlined in the analysis (safety – first behavior), shows that risk aversion is indeed responsible for substantial differences between the demand for fertilizer without risk and actual demand. Risk premiums were high, discouraging the use of high rates of fertilizer. Also, the study found that knowledge of the purpose of tailoring technological recommendations to particular categories of peasants.

(Salem, 1989) used Von Neumann-Morgenstern and Ramsey models to examine the farmers' attitudes towards risk in dry land wheat production areas in Jordan. The results of the study showed that 23% of the farmers were risk averse, 19% were risk neutral, and 58% were risk preferential. The relationship between farmers' personal characteristics and their risk attitudes are also examined. The results showed that the coefficient of farm education level and the coefficient of farm size were statistically significant at 5% of significant level.

3. THE PROBLEM STATEMENT

Increasingly, the concept of risk is becoming more important in the decision – making process of agricultural production and resource allocation. The variability in production and yields of vegetables, and the uncertainty about returns, are the main problems in the vegetable sector in Jordan. This is due to, among other factors, uncertainty. Uncertainty about yield varies because some input variables are invariably beyond the decision – maker's control, and their levels are unknown at the time decisions have to be made about the controlled input variables.

4. OBJECTIVES OF THE STUDY

The main objective of the study is to examine the vegetable farmers' attitudes towards risk in Al-Mafraq Governorate. Specific objectives of the study are:

1. To estimate utility functions for measuring vegetable farmers' risk attitudes in Al-Mafraq Governorate.
2. To examine the relationship between vegetable farmers' personal characteristics such as age, education, farm size, family size, and experience in agriculture, and their attitudes towards risk.

5. RESEARCH METHODOLOGY

The data used to analyze the sources of vegetables farmer's attitudes towards risk in Al-Mafraq Governorate were obtained by personal interviews conducted during the vegetable season of 2014/2015, Secondary data necessary to this study also collected. A random sample of 68 vegetable farmers was selected and interviewed. The sample size of 68 vegetable farmers was determined using the following formula (Dominick, S., 1982) (assuming that N = population is unknown):

$$n = p * q (zx / e) 2$$

Where

n = sample size

p = sample proportion that will occur

q = sample proportion that will not occur

Zx/2 = 1.65, the Z – value used in a 90% confidence interval

e = degree of error (10%)

Assuming that p = 0.50 and q = 0.50

n = 0.50 * 0.50 (1.65/0.10)2 = 68

To realize the objectives of the study, the main sample of 68 farmers and purpose sample of 30 vegetable farmers were selected. Those farmers gave answers that can be used for the purpose of utility function estimation. It is believed that those farmers took the subject seriously so that their decisions are good indications of their preferred choices. Relatively; older, illiterate, and religious farm managers did not accept the idea. This is due to their limited capability to understand and comprehend the information, or/and their religious beliefs, where the respondents have the anti-gambling beliefs.

*Von Neumann – Morgenstern model

This technique is based on a concept called standard reference contract. Two alternatives are considered: Alternative A: probability P of winning, for example, J. D. 1000 and probability (1-P) of losing J. D. 1000. Alternative B: Given a certain amount of cash, (certain cash) different probability levels are assumed by considering the gains and losses of a certain range (e. g.-1000 to 1000 J. D.) to obtain the indifference points between having a certain amount of money (certain cash) and risk taking.

Assumption made by Von Neumann and Morgenstern:

The existence of a utility function implies that the decision-maker satisfies the following four assumptions concerning his preferences among the prospects (Halter and beringer,1960).

1- The person making the choice has in his mind a transitive and complete of all alternative open to him. Thus, if A ≥ B and B ≥ C.

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2- If among entities A, B, C, A ≥ B ≥ C, then there exists some probability value $0 < p < 1$, which will make the person who is choosing indifferent between a certain prospect composed of B and an uncertain prospect composed of A with probability *p* and C with probability
1-*p*.
3- If B ≥ C and A is any entity, then *p* B+(1-*p*) A ≥ *p* C+(1-*p*)A.
4- The process by which the outcome of the gamble is determined does not affect the choice, which is made. Thus, if a person were to choose between a certain prospect of B and an uncertain prospect A and C, it would not matter to him whether his gamble takes the form of a business venture or playing roulette. Thus, love or dislike of gambling *per se* is ruled out.
Appendix A illustrates the Von Neumann – Morgenstern model.

6. RESULTS OF THE STUDY (OUTCOMES)

Using the Von Neumann – Morgenstern quadratic utility functions for 30 vegetable farmers in Al-Mafraq Governorate were estimated. Then the attitude towards risk coefficient for each farmer was estimated. The risk attitude coefficient is defined as the negative ratio of the second to the first derivative of the utility function evaluated at the 2014/2015 farmer's gross income level. This is called the Pratt – coefficient.
When the 30 utility functions were evaluated for the Pratt – coefficient at the decision– makers' gross income level and classified by the sign of the coefficient into risk averse, risk neutral, and risk preferential, it was found that 12 farmers (40%), 14 farmers (47%), and 4 farmers (13%) were falling into the above mentioned categories, respectively. (Figure1). The high percentage of risk–neutral of the sample farmers was consistent with the farmers' attitudes and practices. This is due to the high risk in the vegetable production that is associated with wide fluctuations in returns and high input prices and other natural

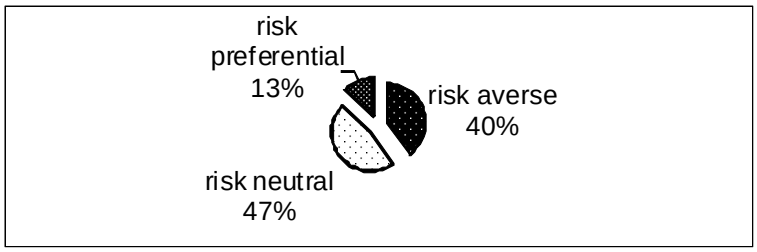

Figure 1: vegetable farmers' risk attitudes in Al-Mafraq Governorate.

& environmental factors that farmers can't control. Results of the utility functions estimation are shown in Table1. Three of the utility functions estimated from the sample are shown in Figure2, where Type1 represents risk-averse, Type2 represents risk-neutral, Type3 represents risk-preferential.

Table 1 The Farmers' Utility Functions

Farmer No.	Utility Function	R^2 100%	Risk Coefficient*
1	$U(X)=8.325869+ .004673X^{**} - 0.0000031X^2$	98.8	+ 0.00394
2	$U(X) =7.482832+ .0046X – 0.0000021X^2$	96.2	+ 0.0105
3	$U(X) = 5 + .0048X + 0.0000000X^2$	98.7	0.00000
4	$U(X) =8.425466+ .004839X - 0.0000033X^2$	99.1	+ 0.01202
5	$U(X) = 6.41 + .01X + 0.0000000X^2$	97	0.00000
6	U(X)= 3.408849+ .005158X + 0.00000165X2	97.1	- 0.00039
7	$U(X) = 5 + .01X + 0.0000000X^2$	100	0.00000
8	$U(X) = 5 + .0048X + 0.0000000 X^2$	98.7	0.00000
9	$U(X) = 5 + .01X + 0.0000000 X^2$	100	0.00000
10	$U(X) =7.586507+ .004216X - 0.0000025 X^2$	95.1	+ 0.01157
11	$U(X) =8.07733+ .004602X - 0.0000028 X^2$	98.3	+ 0.02295
12	$U(X) = 5 + .01X + 0.0000000 X^2$	100	0.00000
13	U(X)= 4.772666+ .005071X + 0.000000316X2	99.1	-0.00010
14	$U(X)=2.097961 + .005338X + 0.00000317X^2$	94.3	-0.00011
15	$U(X) =5.583441+ .00421X - 0.00000015X^2$	93.5	+ 0.00033

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16	$U(X) = 5 + .01X + 0.0000000X^2$	100	0.00000
17	$U(X) = 14.19082 + .005088X - 0.0000093X^2$	99.8	+ 0.14091
18	$U(X) = 7.482832 + .0046X - 0.0000021X^2$	96.2	+0.01050
19	$U(X) = 5 + .01X + 0.0000000X^2$	100	0.00000
20	$U(X) = 5 + .004684X + 0.0000000X^2$	99	0.00000
21	$U(X) = 1.574534 + .004839X + 0.00000326X^2$	99.1	- 0.000147
22	$U(X) = 5 + .01X + 0.0000000X^2$	100	0.00000
23	$U(X) = 6.41 + .01X + 0.0000000X^2$	97	0.00000
24	$U(X) = 7.709013 + .004448X - 0.0000024X^2$	97	+ 0.0375
25	$U(X) = 5 + .01X + 0.0000000X^2$	100	0.00000
26	$U(X) = 5.204781 + .004409X - 0.00000048X^2$	95.5	+ 0.00092
27	$U(X) = 7.598523 + .004367X - 0.0000024X^2$	96.3	+ 0.05106
28	$U(X) = 5 + .01X + 0.0000000X^2$	100	0.00000
29	$U(X) = 5.57 + .01X + 0.0000000X^2$	99	0.00000
30	$U(X) = 4.947568 + .004862X - 0.00000022X^2$	98.2	+ 0.00025

* Negative sign (-) = risk preference; Positive sign (+) = risk averse; Zero (0) = risk neutral.
** X = money in J.D (Jordanian Dinar).

The risk – coefficient was taken as the dependent variable and the farmers' characteristics were taken as independent variables. The independent variables were age, educational level, family size, farm size, and experience in agriculture.
Linear, semi-log, and double-log equations were used. Log-log equation was the best. The regression results of the study indicated that the coefficient of the intercept, the coefficient of age (X1), the coefficient of educational level (X2), were statistically significant at 5% of the significance level. The coefficient of family size (X5), the coefficient of farm size (X3), were statistically significant at 10% of the significance level. The coefficient of agricultural experience (X4) was not statistically significant. The adopted log-log equation is the following:

$$\ln Y^{\wedge} = 52.24 - 14.86 \ln X_1 - 9.43 \ln X_2 + 2.16 \ln X_3 - 0.57 \ln X_4 + 3.4 \ln X_5$$

S.E-Values (23.30) (6.22) (3.24) (1.23) (1.30) (1.88)
t- Values (2.24) (-2.38) (-2.90) (1.75) (-0.43) (1.80)

$R^2 = 0.42$ F= 3.48

Where
Y = risk-coefficient
X_1 = age in years
X_2 = education level in years
X_3 = farm size in dunums
X_4 = experience in agriculture in years
X_5 = family size in number of members

The results showed that the relationship between a farmer's age and level of education and his desire to take risk is inverse. It is understood that the older a farmer is, the less likely he is to take risks. The relationship between the size of the family and the farmer's desire to take risk is positive relationship. Because the farmer needs to achieve a minimum to meet the various expenses. And so is the relationship between farm size and the desire to take risk. A farmer of a big size allows a wide range of diversity in crops production, thus avoiding the dependency on one kind of products. In other words, a high income that a farmer gets from certain activities can compensate the low income of some activities. Consequently, the total income will be at acceptable level.

7. SUMMARYAND CONCLUSIONS

The main objective of the study is to examine the vegetable farmers' attitudes towards risk in Al-Mafraq Governorate. The data used to analyze the farmers' attitudes towards risk were collected through personal interviews, in addition to secondary data necessary to this study. A random sample of 68 vegetable farmers in Al-Mafraq Governorate was selected.

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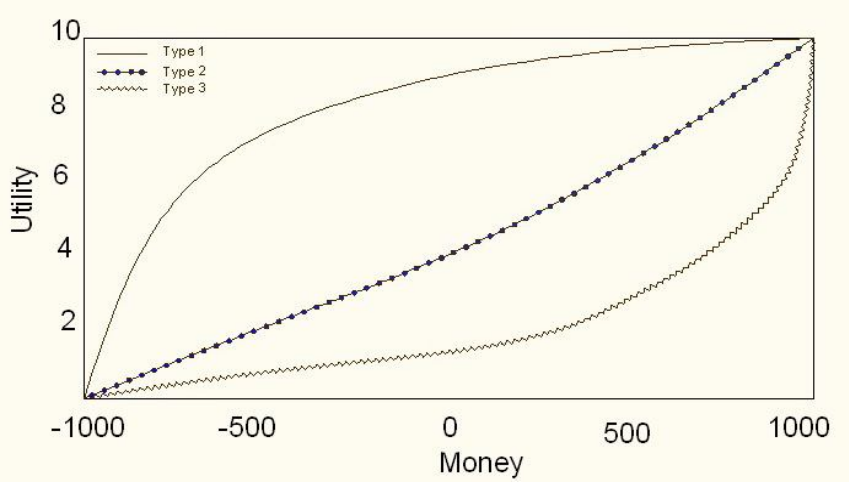

Figure 2: Utility Functions

To measure and explain the risk attitudes of vegetable farmers in Al-Mafraq Governorate, utility functions for a purpose sample of 30 vegetable farmers were estimated. For estimating these utility functions the Von Neumann–Morgenstern model was used. The risk – attitude coefficient (Pratt – coefficient) for each farmer was estimated.

The results of the study indicated that 12 vegetables farmers(40%), 14 farmers (47%), and 4 farmers (13%) fell into three categories of risk averse, risk neutral, and risk preference, respectively. Studying farmers' attitudes towards risk is very important in the decision–making process. These attitudes are considered the main constraints to the adoption rates of vegetable technology by farmers. Consequently, vegetable production is affected by these attitudes. About 47% of the sample farmers are risk–neutral; Agriculture is their only source of incomes. To examine the relationship between the farmers' personal characteristics such as age, education, farm size, family size and experience in agriculture, and their risk attitudes, a multiple linear regression model was used. The risk – coefficient was taken as the dependent variable and the farmers' characteristics were taken as independent variables (age, educational level, farm size, experience in agriculture, and family size). The regression results of the study indicated that the coefficient of intercept, the coefficient of age (X1), the coefficient of educational level (X2), the coefficient of farm size (X3), the coefficient of family size (X5) were statistically significant. However, the coefficient of agricultural experience (X4) was not statistically significant.

On the basis of the above study, it can be concluded that farmers adopt different adoption rates of vegetable technology and management practices because they have different attitudes towards risk. Therefore, the extension agents and farm management consultants should take into consideration farmers' attitudes toward risk in their work and recommendations.

APPENDICES

Appendix A

Von Neumann – Morgenstern Model

For Estimating Utility Functions

This model is based on a concept called standard reference contract. Two alternatives are considered (Halter and Dean,1971):

Alternative A: A reference contract with Probability P of winning J.D. 1000 and probability (1-P) of losing J. D. 1000.

Alternative B: A Given amount of cash for certain (certain cash).

The following probabilities for P are assumed: P = 1.0; P = 0.8; P = 0.6; P = 0.4; P = 0.2; P = 0.0. The gains and losses are considered over the range of -1000 J. D to 1000 J. D. in order to obtain the indifference points between having a certain amount of money (certain cash) and risk taking.

The decision maker (the farmer) is asked to indicate his preference between A and B for a series of different values of P and levels of "certain cash". This process can be clarified by considering Table 2. Alternative B (certain cash) is listed in the left- hand column. Alternative A, providing either J. D.1000 with probability P or – J. D. 1000 with probability (1-P), is listed across the top. The decision maker is then asked to indicate, for each cell in each column, whether he prefers A or B, or is indifferent. For example, start from the bottom of the first column of the Table 2. Do you prefer J. D. 1100 certain cash (B) or a preference contract (A) with probability 1.0 of winning J. D. 1000 and probability 0 of losing J. D. 1000. Alternative B is obviously preferred. Moving up to the next cell, ask a similar question: Do you

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prefer J. D.1000 certain cash (B), or a reference contract (A) with probability 0 – 1 of winning J. D. 1000 or probability 0 of losing J. D. 1000. These alternatives are obviously identical and we write "indifferent". Moving up to the next cell and asking a similar question, we find that A is clearly preferred and likewise for all cells in the remainder of the first column. The remainder of Table 2 is filled out in similar fashion. The indifference points obtained can be used to graph utility functions after associating utilities to each indifference point (Figure 3). We define U (-1000J. D.) = 0 and U (1000J. D.) = 10 as an arbitrary scale. Tasking the other indifference points to calculate the utility associated with as follows:

U (200) = 0.8 * u (1000) + 0.2 * u (-1000) = 0.8 * 10 + 0 = 8
U (-300) = 0.6 * u (1000) + 0.4 * u (-1000) = 0.6 * 10 + 0 = 6
U (-600) = 0.4 * u (1000) + 0.6 * u (-1000) = 0.4 * 10 + 0 = 4
U (-900) = 0.2 * u (1000) + 0.8 * u (-1000) = 0.2 * 10 + 0 = 2
U (-1000) = 0.0 * u (1000) + 1.0 * u (-1000) = 0.0 * 10 + 0 = 0

Polynomial functions can be fitted to the points by ordinary least squares (QLS) in order to determine and illustrate different types of utility functions for different individuals

Table 2 Choice Table for Finding Indifference Points between Certain Cash and Various Reference Contracts

Certain Cash Alternative B	Choice Table for Finding Indifference Points between Certain (Alternative A)					
(J. D.)	P = 1.0	P = 0.8	P = 0.6	P = 0.4	P = 0.2	P = 0
-1100	A	A	A	A	A	A
-1000	A	A	A	A	A	I
-900	A	A	A	A	I	B
-800	A	A	A	A	B	B
-700	A	A	A	A	B	B
-600	A	A	A	I	B	B
-500	A	A	A	B	B	B
-400	A	A	A	B	B	B
-300	A	A	I	B	B	B
-200	A	A	B	B	B	B
-100	A	A	B	B	B	B
0	A	A	B	B	B	B
100	A	A	B	B	B	B
200	A	I	B	B	B	B
300	A	B	B	B	B	B
400	A	B	B	B	B	B
500	A	B	B	B	B	B
600	A	B	B	B	B	B
700	A	B	B	B	B	B
800	A	B	B	B	B	B
900	A	B	B	B	B	B
1000	I	B	B	B	B	B
1100	B	B	B	B	B	B

A = Alternative A
B = Alternative B
I = Indifferent points

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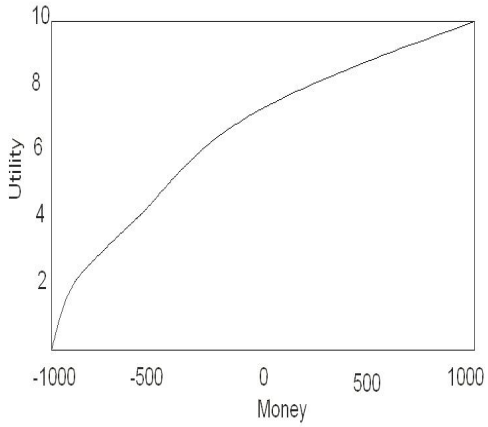

Figure 3: Utility Functions

References

[1] Ministry of Agriculture, the National Strategy, 2009, Jordan.
[2] Ministry of agricultural. (2009). Annual Report.
[3] Central Bank of Jordan, (2015).Publication and Statistics. Monthly Report.
[4] OFFICER R.R.; HALTER A. H., 1968- "Utility Analysis in a Practical Setting," Am. J. Agric. Econ., 50, 257 – 277.
[5] LIN W.; DEAN G.; MOORE C., 1974-" An Empirical Test of Utility vs. Profit Maximization in Agricultural Production," Am. J. Agric. Econ., 56, 497 – 508.
[6] MOSCARDI E.; DE JANVRY A., 1977- "Attitudes toward Risk among Peasants": An Econometric Approach, Am. J. Agric. Econ. 59, 710 – 716.
[7] HALTER A.N.; ROBERT M., 1978- "Utility Measurement and Managerial Behavior," J. Farm Econ. 42, 118 – 132.Butler, M., Kraft, A., & Weiss, I. (2007).
[8] SALEM M.A., 1987- "Risks and Risk Management in Vegetable Production in the Jordan Valley, DIRASAT, 14(8), 309-333.
[9] Dominick, S., "Schaum's Outline of Theory and Problems of Statistics and Econometrics," McGraw – Hall Book Company, 1982, pp. 74 – 75.

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